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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/589,272

06/14/2007

Kiyotaka Ishibashi

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11/26/2010

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1716

NOTIFICATION DATE

DELIVERY MODE

11/26/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/589,272	Applicant(s) ISHIBASHI ET AL.	
	Examiner RAKESH DHINGRA	Art Unit 1716	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 14 and 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/14/2006, 12/09/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of invention of group I (apparatus) claims 1-13 in the reply filed on 11/12/2010 is acknowledged. Accordingly claims 1-13 and the newly added claim 16 have been examined as detailed below. Claims 14, 15 have been withdrawn since pertaining to the non-elected invention (process).

Specification

Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

(1) if a machine or apparatus, its organization and operation;

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- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

In the instant case, the abstract should be in a single paragraph {MPEP 608.01(b)}

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1- 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al (WO 03/105544 corresponding to US 7,469,654 which is referred to hereinafter) in view of Hongoh et al (US 2002/0066536).

Regarding Claim 1: Ishibashi et al teach a plasma processing apparatus comprising:

- a process vessel 1 in which a substrate 11 is processed;
- a gas introducing part (not shown) that introduces process gas into said process vessel;
- a transmissive window 15 including a dielectric to air-tightly cover an upper opening of the process vessel;
- an antenna member 3c, located above the transmissive window, that introduces a microwave into the process vessel;
- a support part 10 supporting a peripheral edge portion of said transmissive window 15; and an exhaust pipe (not shown) that exhausts an atmosphere in the process vessel via an exhaust device 9,

wherein said transmissive window 15 has, in a center area thereof, a hanging portion (with side wall 31 shown in Figure 20) made of a same material as a material of said transmissive window, and a gap is formed between an outer peripheral surface 31 of the hanging portion and a sidewall of said support part 10 (e.g. Figs. 20, 21 and col. 11, lines-8-30).

Ishibashi et al do teach a gap between an outer peripheral surface of the hanging portion and a sidewall of said support part but do not explicitly teach gap is with a predetermined distance or more.

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However it is known in the art to provide a predetermined gap between adjoining parts in microwave plasma apparatus to avoid abnormal discharge due to localized microwave electric fields as per reference cited hereunder.

Hongoh et al teach a microwave plasma apparatus wherein a transmissive plate 80 with an overhang portion is supported on a support 122 in a plasma chamber 36. Hongoh et al further teach a predetermined gap is provided between the overhang portion of the transmissive plate and the supporting part and also by curving the sharp corners of the support shelf 122 to prevent occurrence of abnormal discharge (e.g. Fig. 3 and para. 0048-0052).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a predetermined gap between an outer peripheral surface of the hanging portion and a sidewall of said support part as taught by Hongoh et al in the apparatus of Ishibashi et al to prevent occurrence of abnormal discharge and provide enhanced uniformity of plasma processing.

Regarding Claims 2, 3: Hongoh et al teach sealing groove 108 is 3-6 mm in depth (which nearly matches the claimed range gap of 0.5 to 5 mm. Hongoh et al also teach that corners P3, P4, and P5 of the support part 106 are also suitably curved to prevent any abnormal discharge between the dielectric window 80 and the supporting part 106 (Figs. 2, 3 and para. 0035-0037, 0048-0050). It would be obvious to provide the predetermined distance depending upon process limitations like material of the transmissive plate etc so as to prevent abnormal discharge between the transmissive plate and the support part and obtain enhanced uniformity of plasma processing.

Regarding Claim 4: Ishibashi et al teach that that reflecting surface 31 can be inclined to the main surface of the top plate 15 (e.g. col. 11, lines 24-43). It would be obvious to provide the hanging portion of the transmissive plate 15 as tapered so as to prevent undesired propagation of high frequency waves inside the transmissive plate and density distribution of plasma can be made more uniform within the plasma chamber.

Regarding Claim 5: Ishibashi et al teach a recessed portion is formed in a center side area of the hanging portion (e.g. Figs. 18, 19).

Claims 6 – 9, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al (WO 03/105544 corresponding to US 7,469,654 which is referred to hereinafter) in view of Hongoh et al (US 2002/0066536) as applied to claims 1- 5 and further in view of Mabuchi et al (US 6,091,045).

Regarding Claim 6: Ishibashi et al in view of Hongoh et al teach all limitations of the claim including recessed portion formed in a center side area of the hanging portion, but do not explicitly teach a sidewall forming the recessed portion is a tapered surface inclining toward a center side of the recessed portion.

Mabuchi et al teach a plasma apparatus comprising a process chamber 11 and a transmissive plate 14 with a hanging portion and a recesses portion formed in a center side area of the hanging portion. Mabuchi further teach that the recessed portion can be suitably shaped including a tapered surface inclining toward a center side of the recessed portion to further improve plasma uniformity (e.g. Figs. 2, 7, 9-11 and col. 4, line 30 to col. 6, line 67).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the recess with a tapered surface as taught by Mabuchi et al in the apparatus of Ishibashi et al in view of Hongoh et al to obtain enhanced plasma uniformity

Regarding Claim 7: Mabuchi et al teach a width of the hanging portion is $\{(DA2-DA1)/2 = (258-190)/2 = 34 \text{ mm}\}$. Further, Hongoh et al teach (para. 0044) that for quartz dielectric window, $\lambda/4$ is $33.5/2 = 16.7 \text{ mm}$. Mabuchi et al also teach that diameter of recess is determined based upon process limitations like uniformity of processing, higher rate of processing etc, and thus it would be obvious to optimize the width of the hanging portion accordingly (Figs. 10, 11, Table 1 and col. 4, lines 30-62) {claim limitation "width of hanging portion" is interpreted to imply width of hanging portion when the window has a recessed portion in the center area}.

Regarding Claim 8: Mabuchi et al teach vertical length L of hanging portion (HA1 – Fig. 11) can be 12 mm (Fig. 11 and col. 4, lines 53-62 and Table 1). Further (as explained above under claims 2, 3) , Hongoh et al teach that predetermined distance D can be selected as per process limitations like material of the transmissive plate, and can be e.g. 3-6 mm (para. 0035). Therefore ratio of L/D would be 2-4 which meets the claimed value of equal to or more than 3.

Regarding Claim 9: Mabuchi et al teach vertical length of hanging portion (HA1 – Fig. 11) can be 12 mm. Mabuchi et al further teach that recess depth (vertical height of the hanging portion) is determined based upon process limitations like thickness of the transmissive window, plasma processing rate and uniformity (e.g. col. 4, lines 53-62). It would thus be obvious to optimize the vertical height of the hanging portion as per

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process limitations like thickness of the transmissive window, plasma processing rate and uniformity.

Regarding Claim 16: Hongoh et al teach corner portions P3, P5 of the support part 106 are curved to avoid electric field concentration and prevent abnormal discharge (para. 0034-0036). Further, Mabuchi et al teach edge of recess 14a may be curved (e.g. Fig. 7 and col. 5, lines 10-15). It would be obvious to provide curves at corners of the transmissive plate, viz. corner portions on a boundary between the outer peripheral surface of the hanging portion and a portion, in the transmissive window, supported by the support part, and corner portions on a boundary between the outer peripheral surface of the hanging portion and a lower surface of the hanging portion, in view of teachings of Hongoh et al and Mabuchi et al to further avoid electric field concentrations and prevent abnormal discharge and thus obtain improved uniformity of plasma processing.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishibashi et al (WO 03/105544 corresponding to US 7,469,654 which is referred to hereinafter) in view of Hongoh et al (US 2002/0066536) as applied to claims 1 - 5 and further in view of O'Donnell et al (US 2004/0002221).

Regarding Claim 10: Ishibashi et al in view of Hongoh et al teach all limitations of the claim except the support part or the side wall facing the inside of the process vessel is coated with Y₂O₃.

O'Donnell et al teach a plasma apparatus wherein interior chamber walls, dielectric window etc are coated with Y₂O₃ to prevent their deterioration when exposed to plasma (para. 0050).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a coating of Y₂O₃ on the support part as taught by O'Donnell et al in the apparatus of Ishibashi et al in view of Hongoh et al to prevent deterioration when exposed to plasma.

Claims 11-13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hongoh et al (US 2002/0066536).

Regarding Claim 11: Hongoh et al teach a plasma processing apparatus comprising:

- a process vessel 36 in which a substrate W is processed;
- a gas introducing part 52 that introduces process gas into said process vessel;
- a transmissive window 80 including a dielectric to air-tightly cover an upper opening of the process vessel;
- an antenna member 86, located above the transmissive window, that introduces a microwave into the process vessel;
- a support part 106 supporting a peripheral edge portion of said transmissive window 80; and an exhaust pipe 76 that exhausts an atmosphere in the process vessel via an exhaust device (not shown),

wherein under said support part, an eave portion (lower stepped portion on which the sealing ring 110 rests – Fig. 2) projecting into the process vessel is provided to be

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apart from a lower surface of said transmissive window 80 by a predetermined distance (i.e. the depth of sealing ring groove 108) {e.g. Figs. 1, 2 and para. 0025-0035}.

Regarding Claims 12, 13: Hongoh et al teach sealing groove 108 is 3-6 mm in depth (which nearly matches the claimed range gap of 0.5 to 5 mm (para. 0035).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

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be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1) Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 8 of copending Application No. 10/570,631 (US PGPUB 2007/0113788) in view of Hongoh et al (US 2002/0066536).

Claim 8 of the copending application teaches all limitations of claim 1 of the instant application including a process vessel with a transmissive (top) plate having a hanging portion (plurality of conical ring shaped projections on the lower surface of the top plate). Further, the apparatus would obviously have a support part for supporting a peripheral edge of the transmissive plate, and which would have a gap between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Claim 8 of the copending application does not explicitly teach a support part and a gap with predetermined distance formed between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Hongoh et al teach a microwave plasma apparatus wherein a transmissive plate 80 with an overhang portion is supported on a support 122 in a plasma chamber 36. Hongoh et al further teach a predetermined gap is provided between the overhang portion of the transmissive plate and the supporting part and also by curving the sharp corners of the support shelf 122 to prevent occurrence of abnormal discharge (e.g. Fig. 3 and para. 0048-0052).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a support part and predetermined gap between an outer peripheral surface of the hanging portion and a sidewall of said support part as taught by Hongoh et al in the apparatus of claim 8 of the copending application et al to provide enhanced uniformity of plasma processing.

This is a provisional obviousness-type double patenting rejection.

2) Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 4 of copending Application No. 11/632,779 (US PGPUB 2008/0035058) in view of Hongoh et al (US 2002/0066536).

Claims 1, 2, 4 of the copending application teach all limitations of claim 1 of the instant application including a process vessel with a transmissive (top) plate having a hanging portion (plurality of concentric ridges disposed on the lower surface of the top plate). Further, the apparatus would obviously have a support part for supporting a peripheral edge of the transmissive plate, and which would have a gap between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Claims 1, 2, 4 of the copending application do not explicitly teach a support part and a gap with predetermined distance formed between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Hongoh et al teach a microwave plasma apparatus wherein a transmissive plate 80 with an overhang portion is supported on a support 122 in a plasma chamber 36. Hongoh et al further teach a predetermined gap is provided between the overhang

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portion of the transmissive plate and the supporting part and also by curving the sharp corners of the support shelf 122 to prevent occurrence of abnormal discharge (e.g. Fig. 3 and para. 0048-0052).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a support part and predetermined gap between an outer peripheral surface of the hanging portion and a sidewall of said support part as taught by Hongoh et al in the apparatus of claims 1, 2, 4 of the copending application to provide enhanced uniformity of plasma processing.

This is a provisional obviousness-type double patenting rejection.

3) Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 4 of copending Application No. 11/691154 (US PG PUB 2007/0221294) in view of Hongoh et al (US 2002/0066536).

Claim 1 of the copending application teaches all limitations of claim 1 of the instant application including a process vessel with a transmissive (dielectric transmission) plate having a hanging portion (annular projecting portion extending downward). Claim 1 also teaches an annular support portion (part of upper plate) for supporting a peripheral edge of the transmissive plate, and which has a gap between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Claim 1 of the copending application does not explicitly teach a gap with predetermined distance formed between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Hongoh et al teach a microwave plasma apparatus wherein a transmissive plate 80 with an overhang portion is supported on a support 122 in a plasma chamber 36. Hongoh et al further teach a predetermined gap is provided between the overhang portion of the transmissive plate and the supporting part and also by curving the sharp corners of the support shelf 122 to prevent occurrence of abnormal discharge (e.g. Fig. 3 and para. 0048-0052).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a predetermined gap between an outer peripheral surface of the hanging portion and a sidewall of said support part as taught by Hongoh et al in the apparatus of claim 1 of the copending application to provide enhanced uniformity of plasma processing.

This is a provisional obviousness-type double patenting rejection.

4) Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 4 of US Patent No. 6,953,908 in view of Hongoh et al (US 2002/0066536).

Claim 1 of the patent teaches all limitations of claim 1 of the instant application including a process vessel with a transmissive plate (dielectric member) having a hanging portion (projection in a circumferential direction). Further, the apparatus would obviously have a support part for supporting a peripheral edge of the transmissive plate, and which would have a gap between an outer peripheral surface of the hanging portion and a sidewall of the support part.

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Claim 1 of the patent does not explicitly teach a support part and a gap with predetermined distance formed between an outer peripheral surface of the hanging portion and a sidewall of the support part.

Hongoh et al teach a microwave plasma apparatus wherein a transmissive plate 80 with an overhang portion is supported on a support 122 in a plasma chamber 36. Hongoh et al further teach a predetermined gap is provided between the overhang portion of the transmissive plate and the supporting part and also by curving the sharp corners of the support shelf 122 to prevent occurrence of abnormal discharge (e.g. Fig. 3 and para. 0048-0052).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a support part and predetermined gap between an outer peripheral surface of the hanging portion and a sidewall of said support part as taught by Hongoh et al in the apparatus of claim 1 of the patent to provide enhanced uniformity of plasma processing.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RAKESH DHINGRA/
Examiner, Art Unit 1716